FORM PTO-1390 (REV. 1-98)	U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER 05021001
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 10/019527
INTERNATIONAL APPLICATION NO. PCT/FR00/01932	INTERNATIONAL FILING DATE July 5, 2000		PRIORITY DATE CLAIMED July 5, 1999

TITLE OF INVENTION
POWER ASSISTANCE DEVICE FOR AN ULTRASONIC VIBRATION DENTAL HANDPIECE

APPLICANT(S) FOR DO/EO/US
Dominique MARIAULLE, Xavier CAPET and Pascal CABRIGNAC

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.

2. [ ] This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.

3. [X] This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).

4. [X] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
    a. [X] is transmitted herewith (required only if not transmitted by the International Bureau).
    b. [ ] has been transmitted by the International Bureau.
    c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).

6. [X] A translation of the International Application into English (35 U.S.C. 371(c)(2)).

7. [ ] Amendments to the claims of the International Aplication under PCT Article 19 (35 U.S.C. 371(c)(3))
    a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).
    b. [ ] have been transmitted by the International Bureau.
    c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
    d. [ ] have not been made and will not be made.

8. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).

9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. [ ] A translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. [X] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.

12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

13. [X] A FIRST preliminary amendment.
    [ ] A SECOND or SUBSEQUENT preliminary amendment.

14. [ ] A substitute specification.

15. [ ] A change of power of attorney and/or address letter.

16. [X] Other items or information:

       International Preliminary Examination Report.
       Abstract
       Application Data Sheet.
       Search Report.

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
10/019527	PCT/FR00/01932	05021001

17. ☒ The following fees are submitted:

		CALCULATIONS PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USTPO and International Search Report not prepared by the EPO or JPO .... $1,040.		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO .... 890.		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO .... 740.		
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) .... 710.		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) .... 100.		

ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 890	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☒ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$ 130	

CLAIMS	NUMBER FILED		NUMBER EXTRA	RATE		
Total claims	4	- 20 =	0	x $ 18.	$ 0	
Independent claims	1	- 3 =	0	x 84.	$ 0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				+ 280.	$	

TOTAL OF ABOVE CALCULATIONS =	$ 1,020	
Reduction of 1/2 for small entity	$	
SUBTOTAL =	$ 1,020	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)).	$	
TOTAL NATIONAL FEE =	$ 1,020	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property +	$	
TOTAL FEES ENCLOSED =	$ 1,020	
	Amount to be refunded:	$
	charged:	$

a. ☒ A check in the amount of $ 1,020 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required by 37 CFR 1.16 and 1.17, or credit any overpayment to Deposit Account No. 25-0120. A duplicate copy of this sheet is enclosed.
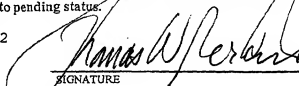
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Young & Thompson
745 South 23rd Street
2nd Floor
Arlington, VA 22202
(703) 521-2297

CUSTOMER NO. 000466

January 3, 2002

SIGNATURE

Thomas W. Perkins
NAME

33,027
REGISTRATION NUMBER

PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Dominique MARIAULLE et al.

Serial No. (unknown)

Filed herewith

POWER ASSISTANCE DEVICE FOR
AN ULTRASONIC VIBRATION
DENTAL HANDPIECE

PRELIMINARY AMENDMENT

Commissioner of Patents

Washington, D.C. 20231

Sir:

Prior to calculation of the filing fee, please amend the above-identified application as follows:

IN THE ABSTRACT:

Replace the Abstract filed with the specification with the Abstract attached hereto.

IN THE CLAIMS:

Amend claim 3 as follows:

--3. (amended)   Device according to claim 1, characterized in that the supply means (1) are connected to the work circuit via a voltage transformer (T_1).

Amend claim 4 as follows:

--4. (amended)   Device according to claim 1, characterized in that the inductance (L_s) arranged between the output terminals (S_1, S_2) of the work circuit is such that, with the intrinsic capacitance of the handpiece (5) and the

Dominique MARIAULLE et al.

internal resistance thereof, an RLC circuit close to the resonance is formed.--
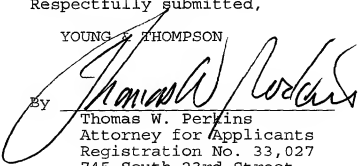
R E M A R K S

Attached hereto is a marked-up version of the changes made to the Abstract and claims by the current amendment. The attached pages are captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

Respectfully submitted,

YOUNG & THOMPSON

By _____
Thomas W. Perkins
Attorney for Applicants
Registration No. 33,027
745 South 23rd Street
Arlington, VA 22202
Telephone: 703/521-2297

January 3, 2002

ABSTRACT OF THE DISCLOSURE

A power assistance device for an ultrasonic dental handpiece (5) includes a working circuit with a parallel impedance (Ls) between the output terminals (S1,S2) and a control circuit with a current transformer (T2), the primary winding (7) thereof is serially arranged in the working circuit and the secondary winding (11) thereof forms an RLC circuit in conjunction with a capacitor (13) and a resistor (15) associated therewith. The voltage of the circuit at the terminals of the resistor (15) is transmitted to the input of a power supply (1). The control circuit enables variations in the value of the capacitor (13) and/or the value of the self-inductance coil of the secondary winding (11) of the trans-former (T2).

MARKED-UP VERSION OF CHANGES MADE TO THE CLAIMS

3. Device according to ~~one of Claims 1 or 2~~ claim 1, characterized in that the supply means (1) are connected to the work circuit via a voltage transformer (T_1).

4. Device according to ~~one of the preceding Claims~~ claim 1, characterized in that the inductance (L_s) arranged between the output terminals (S_1, S_2) of the work circuit is such that, with the intrinsic capacitance of the handpiece (5) and the internal resistance thereof, an RLC circuit close to the resonance is formed.--

ABSTRACT OF THE DISCLOSURE

The invention relates to a A power assistance device for an ultrasonic dental handpiece (5) . Said device comprises includes a working circuit comprising with a parallel impedance (Ls) between the output terminals (S1,S2) and a control circuit which consists of with a current transformer (T2), whereby the primary winding (7) thereof is serially arranged in the working circuit and the secondary winding (11) thereof forms an RLC circuit in conjunction with a capacitor (13) and a resistor (15) associated therewith., whereby the The voltage of said the circuit at the terminals of the resistor (15) is transmitted to the input of the above-mentioned a power supply (1). The control circuit comprises means enabling enables variations in the value of the capacitor (13) and/or the value of the self-inductance coil of the secondary winding (11) of the transformer (T2).

POWER ASSISTANCE DEVICE FOR AN ULTRASONIC VIBRATION
DENTAL HANDPIECE

The present invention relates to an electronic servo-control device for dental handpiece, of the type in which the vibration of a tool is obtained by means
5   of a piezoelectric transducer.

It is known that a piezoelectric transducer generating ultrasound vibrations is, where possible, used in resonance so as to obtain maximum amplitudes and power of the vibrations. When such a transducer, to which a tool is mechanically coupled, comes into contact during a work phase with tissues of different natures,
10 i.e. hard tissues, soft tissues, with or without the presence of a liquid, its resonant circuit evolves during the work. It is known that, in such a handpiece, the speed of vibration of the transducer is a direct function of the electric current which circulates therein and that the effort necessary for this vibration is a direct function of the supply voltage at the terminals of said transducer. It will be
15 understood that, if it is desired that a handpiece operates with optimum yield, the vibrations of the transducer must correspond to the series resonance of this handpiece and, during work, the operational conditions must vary so as to remain in resonance.

According to the invention, the frequency will be tracked by observing the
20 phase-shift which exists between the voltage and the

current supplied and by electrically compensating the intrinsic capacity of the transducer. Such an electric circuit is translated in series resonance by a low impedance and a zero phase-shift.

5   The present invention thus has for its object to propose such a device for servo-control of the piezoelectric transducer of a vibration generator for dental handpiece, adapted to operate permanently at series resonance frequency, whatever the nature of the tissues on which the tool with which this handpiece is equipped, operates.

10   The present invention thus relates to a device for servo-control of a dental handpiece activated by an ultrasound generator, comprising supply means of given frequency, characterized in that:

- it comprises two circuits, namely a work circuit to whose terminals the ultrasound generator is connected, and a control circuit,

- the work circuit comprises an inductance in parallel between its output
15   terminals,

- the supply is adapted to deliver at the output a voltage in phase with a voltage which is delivered thereto on its input,

- the control circuit is constituted by an intensity transformer whose primary is arranged in series in the work circuit and whose secondary forms, with
20   a capacitor and a resistor associated therewith, an RLC circuit of which the voltage at the terminals of the resistor is sent to the input of said

supply,

- the control circuit comprises means for varying the value of the capacitor and/or that of the self-induction coil of the secondary of the intensity transformer.

The secondary of the intensity transformer preferably comprises a core
5   mobile inside its winding adapted to vary its inductance.

In a preferred embodiment, the supply means will be connected to the work circuit via a voltage transformer of which the inductances of the primary and of the secondary will be high.

In an interesting form of embodiment of the invention, the inductance
10   arranged between the output terminals of the work circuit will be such that, with the intrinsic capacitance of the handpiece and the internal resistance thereof, an RLC circuit close to the resonance is formed.

A form of embodiment of the present invention will be described hereinafter by way of non-limiting example, with reference to the accompanying
15   drawings, in which:

Figure 1 schematically shows a frequency tracking device according to the invention.

Figure 2 schematically shows the phase-shifts between current and intensity in a circuit of the type shown in Figure 1.

20   Figure 3 is a curve representing the variation of the phase-shift between current and voltage in a circuit according to the invention as a function of a multiple of the

frequency.

Figure 4 is a curve representing the respective variations as a function of the frequency, of the power supplied to a specific handpiece and of the corresponding phase-shift between current and intensity.

5   The frequency tracking oscillator shown in Figure 1 is essentially constituted by a supply 1 capable of generating between its two output terminals A and B a voltage V_P which supplies the primary 3 of a voltage transformer T_1. One of the terminals C of the secondary 4 of this transformer is connected to an output S1 of the circuit to which an input E_1 of a handpiece 5 is connected. The

10   other terminal D of this same secondary 4 is connected to the other output S2 of the circuit with the interposition of the primary 7 of a current transformer T_2. The second input E2 of the handpiece 5 is connected to the terminal S2. An inductance 9 of value L_s is arranged in parallel between the input terminals E_1 and E_2 of the handpiece 5.

15   As is shown in Figure 1, the secondary 11 of the intensity transformer T_2 is arranged in series with a capacitor 13 of value C_2 and a resistor 15 of value R_2, the latter representing the parasitic resistors of the RLC circuit thus formed.

The terminals G and H of the resistor 15 are connected to input terminals IJ of the supply 1.

20   There are thus two circuits, namely a work circuit which controls the handpiece 5 and a control circuit constituted by the RLC circuit.

The supply 1 is constituted so that the

voltage V_P produced on its output terminals A, B is in phase with the voltage V_r existing between its input terminals I and J.

Under these conditions, as schematically shown in Figure 2, for the oscillator constituted by the self-induction coil 11, the capacitor 13 and the
5   resistor 15 to enter in oscillation, the signal of voltage V_r collected at the terminals of the resistor R_2 must be in phase with V_s, which condition is met if $\varphi2$ = - $\varphi1$. In effect, $\varphi2$ and $\varphi1$ represent the phase-shift between voltage and intensity respectively in the oscillating control RLC circuit and in the work circuit controlling the vibrations of the handpiece 5.
10   If the voltage V_r existing between the input terminals I and J of the supply 1 is expressed as a function of the current I_1 circulating in the primary 7 of the transformer T2, it will be noted that the current I_1 is delayed by $\varphi1$ with respect to voltage V_s (or to voltage V_p) and that the voltage V_r is in phase with the current I_2.
15   If the equations of the transformer are taken into account, the following will be obtained by using the complex mathematical notification:

$$V_1 = Z_1I_1 + jm\omega I_2 \text{ with } Z_1 = jL_1\omega \qquad (1)$$

$$0 = Z_2I_2 + jm\omega I_1 \text{ with } Z_2 = R_2 + j(L_2\omega - 1/C_2\omega) \qquad (2)$$

m representing the coefficient of mutual inductance of one of the windings of the
20   transformer on the other winding.

The transformer T_2 being an intensity transformer, it is possible, in known manner, to disregard the influence of the secondary winding on the primary winding so

that the expression $jm\omega I_2 = 0$ and the value of I_1 is drawn from equation (1), viz.:

$I_1 = V_1 \ / \ jL_1\omega = -jV_1 \ / \ L_1\omega$

By transferring this value in equation (2), the expression of the current I_1 in the work circuit as a function of the current I_2 in the RLC circuit is obtained, viz.:

5          $I_1 = 1/m\omega \ (1/C_{1\omega}-L_{2\omega}+jR_2) \ I_2$

Under these conditions, the phase-shift of the current I_2 with respect to current I_1 will be:

$tg\varphi_2 = R_2 /\omega \ / \ (1/C_2\omega - L_2\omega) = R_2C_2\omega \ / \ 1-L_2C_2\omega^2$ (3)

Under these conditions, as mentioned hereinbefore, there will be oscillation

10   if $\varphi_2 = -\varphi_1$ or $t_g\varphi_2 = -t_g\varphi_1$, viz. from the equation (3):

$R_2C_2\omega \ /1-L_2C_2\omega^2 = -t_g\varphi_1$ (4)

Figure 3 shows the variation of the value of $t_g\varphi_1$ as a function of the value of ω which represents the vibration frequency, to within the value of 2π ($\omega=2\pi N$).

It will be noted that, without handpiece, the load of the oscillator in the

15   work circuit is reduced to the value of the inductance Ls arranged in parallel between the output terminals S_1 and S_2 of the circuit. Furthermore, if R_s designates the internal resistance of the oscillator, the phase-shift of the current I_1 with respect to V_s is expressed by the expression:

$t_{g\varphi} = L_s/R_s$

20   The condition of oscillation $tg\varphi_2 = -tg\varphi_1$ then becomes:

$R_2C_2\omega \ / \ (1-L_2C_2\omega^2) = -L_s\omega_s/R_s$

or $\omega^2 = (L_s+R_sR_2C_2) / (L_sL_2C_2)$ (5)

By playing on the values of L_2 of the winding of the secondary 11 of the transformer T_2 and/or the value C_2 of the capacitor 13, the frequency of the oscillator may be adjusted off-load so that the synchronization curve shown in Figure 3 is modified.

In practice, R_2 represents the parasitic resistances of the circuit and C_2 will be conserved constant.

For each apparatus of a given series, it will then suffice to vary the value L_2 of the secondary 11 of the transformer T_2 until the voltage T_1 is in phase with the current I_1 circulating in the circuit.

The apparatus will then be calibrated and the oscillator will "lock" on the inductive delay load L_s.

Furthermore, as shown in Figure 4, a curve is available, which represents the variation of the power at the terminals E1, E2 of the handpiece 5, as well as the value of the phase-shift between current and intensity at the terminals thereof. Each type of handpiece 5 provided with a determined tool will thus have a curve of this type.

In the example of Figure 4, it will be observed that the power is maximum and the phase-shift is zero for a frequency of around 30 kHz. This value plotted at point X in the diagram of Figure 3 shows that the adjustment of the RLC circuit is correct since the value of $tg\varphi_1$ for this frequency is close to 0.

It is, of course, known that, during operation of the handpiece, the value of the frequency for which a maximum vibration with zero phase-shift is obtained,

varies as a function, on the one hand, of the physical nature of the handpiece but also as a function of the surface state of the material to be treated. For a handpiece and a given tool, two extreme frequences N_1 and N_2 will therefore be obtained, corresponding to the tool working on soft tissues and harder elements,

5   to which values X_1 and X_2 of ω will correspond, as shown in Figure 3.

It has been observed that, in general, the frequency N lay at about 30 kHz. Under these conditions, an off-load adjustment of each circuit produced will be proceeded with (by adjusting the value of L_2 for example) so that, during work, points X_1 and X_2 indeed lie within zones for which tg_1 is close to zero, as shown

10   in Figure 3.

The variation of the inductance L_2 may in particular be obtained by displacing a core at the centre of the self-induction coil 11.

CLAIMS

1.   Device for servo-control of a dental handpiece (5) activated by an ultrasound generator, comprising supply means (1), characterized in that:

5   - it comprises two circuits, namely a work circuit to whose terminals (S1, S2) the ultrasound generator is connected, and a control circuit,

- the work circuit comprises an inductance (L_s) in parallel between its output terminals (S1, S2),

- the supply (1) is adapted to deliver at the output (A, B) a voltage (V_s) in phase with a voltage which is delivered thereto on its input (I, J),

10   - the control circuit is constituted by an intensity transformer (T_2) whose primary (7) is arranged in series in the work circuit and whose secondary (11) forms, with a capacitor (13) and a resistor (15) associated therewith, an RLC circuit of which the voltage at the terminals of the resistor (15) is sent to the input of said supply (1),

15   - the control circuit comprises means for varying the value of the capacitor (13) and/or that of the self-induction coil of the secondary (11) of the transformer (T_2).

2.   Device according to Claim 1, characterized in that the secondary (11) of the intensity transformer (T_2) comprises a core mobile inside its winding adapted

20   to vary its inductance (L_2).

3.   Device according to one of Claims 1 or 2, characterized in that the supply means (1) are connected to the work circuit via a voltage transformer (T_1).

4.   Device according to one of the preceding Claims, characterized in that the inductance (L_s) arranged between the output terminals (S_1, S_2) of the work circuit is such that, with the intrinsic capacitance of the handpiece (5) and the internal resistance thereof, an RLC circuit close to the resonance is formed.

POWER ASSISTANCE DEVICE FOR AN ULTRASONIC VIBRATION DENTAL HANDPIECE

5

ABSTRACT

The invention relates to a power assistance device for an ultrasonic dental handpiece (5). Said device comprises a working circuit comprising a parallel

10   impedance (Ls) between the output terminals (S1, S2) and a control circuit which consists of a current transformer (T2), whereby the primary winding (7) thereof is serially arranged in the working circuit and the secondary winding (11) forms an RLC circuit in conjunction with a capacitor (13) and a resistor (15) associated therewith, whereby the voltage of said circuit at the terminals of the resistor (15)

15   is transmitted to the input of the above-mentioned power supply (1). The control circuit comprises means enabling variations in the value of the capacitor (13) and/or the value of the self-inductance coil of the secondary winding (11) of the transformer (T2).
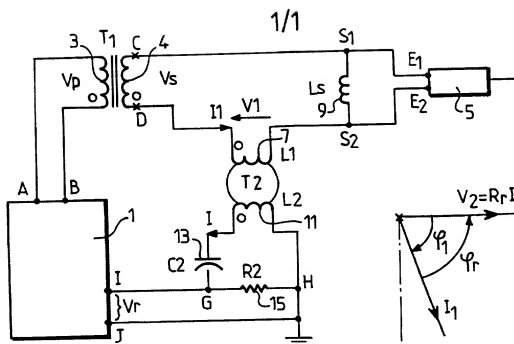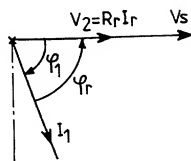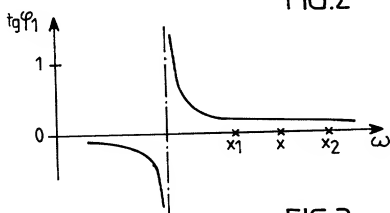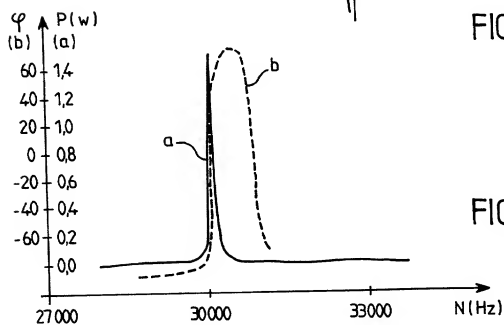
FIG.1

FIG.2

FIG.3

FIG.4

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

POWER ASSISTANCE DEVICE FOR AN ULTRASONIC VIBRATION DENTAL HANDPIECE

the specification of which: *(check one)*

REGULAR OR DESIGN APPLICATION

[ ]   is attached hereto.

[X]   was filed on January 3, 2002, as application Serial No.   and was amended on (if applicable).

PCT FILED APPLICATION ENTERING NATIONAL STAGE

[X]   was described and claimed in International application PCT/FR00/01932 filed on July 5, 2000, and as amended on (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

PRIORITY CLAIM

I hereby claim foreign priority benefits under 35 USC 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)

Country	Application Number	Date of Filing (day, month, year)	Priority Claimed
France	99.08643	July 5, 1999	yes

(Complete this part only if this is a continuing application.)

I hereby claim the benefit under 35 USC 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)   (Filing Date)   (Status--patented, pending, abandoned)

POWER OF ATTORNEY

The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from ____ _____ as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

As a named inventor, I hereby appoint the following attorney(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: **Robert J. PATCH, Reg. No. 17,355,** **Andrew J. PATCH, Reg. No. 32,925,** Robert F. HARGEST, Reg. No. 25,590, Benoît CASTEL, Reg. No. 35,041, Eric JENSEN, Reg. No. 37,855, and Thomas W. PERKINS, Reg. No. 33,027, c/o YOUNG & THOMPSON, Second Floor, 745 South 23rd Street, Arlington, Virginia 22202.

Address all telephone calls to Young & Thompson at 703/521-2297.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: *MARIAULLE DOMINIQUE*
   (given name, family name)

Inventor's signature _____   Date _____

Residence: Le Haillan, France   Citizenship: French

Post Office Address: 12, rue des Genêts
                       33185 Le Haillan, France

Full name of second joint inventor, if any: *CAPET Xavier*
   (given name, family name)

Inventor's signature _____   Date _____

Residence: Cestat Gazinet, France   Citizenship: French

Post Office Address: 4, allée du Rouquet
                       33610 Cestat Gazinet, France

Full name of third joint inventor, if any: *CABRIGNAC Pascal*
   (given name, family name)

Inventor's signature _____   Date _____

Residence: Merignac, France   Citizenship: French

Post Office Address: 28, rue Bir-Hakeim
                       33700 Merignac, France

Form Y&T (2/97)